

SHIP PRODUCTION COMMITTEE  
FACILITIES AND ENVIRONMENTAL EFFECTS  
SURFACE PREPARATION AND COATINGS  
DESIGN/PRODUCTION INTEGRATION  
HUMAN RESOURCE INNOVATION  
MARINE INDUSTRY STANDARDS  
WELDING  
INDUSTRIAL ENGINEERING  
EDUCATION AND TRAINING

November 15, 2000  
NSRP 0564  
N1-96-4

# **THE NATIONAL SHIPBUILDING RESEARCH PROGRAM**

## **Environmental Studies and Testing (Phase IV)**

U.S. DEPARTMENT OF THE NAVY  
CARDEROCK DIVISION,  
NAVAL SURFACE WARFARE CENTER

in cooperation with  
National Steel and Shipbuilding Company  
San Diego, California

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**FINAL REPORT**  
**on**  
**ENVIRONMENTAL STUDIES AND TESTING (PHASE IV)**

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**National Shipbuilding Research Program**

**Project N1-96-4**

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**Submitted by**

**Robinson-Page-McDonough and Associates, Inc.**

**Post Office Box 9**

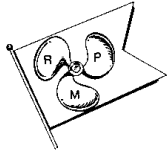
**Greenland, New Hampshire 03840**

**(603) 436-7762**

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**30 September 2000**

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**Environmental Studies and Testing (Phase IV)**  
**Task No. N1-96-4**

30 Sep 2000

**Final Report**

This Project was begun on 07 Aug 1996 and was completed on 30 Sep 2000 under NASSCO Purchase Order MU300062-D dated 19 Jul 1996. Administrative arrangements for prosecuting Subtasks under this Project were developed, based on the general requirements for performing projects under the NSRP. These arrangements were approved by the members of the SPC Panel SP-1 Ad Hoc Committee for Environmental Studies and Testing (ES&T), and by the NSRP Program Manager at NASSCO. A total of 42 Potential Tasks were considered by the Ad Hoc Committee, from which nineteen Subtasks were approved for performance, as follows:

**Subtask #12 - Part 2 - Develop Shipyard MACT Implementation Plan and Compliance Tools: Training.**

This Subtask developed and performed five training sessions on the use of the compliance tools produced by Subtask #12 Part 1 (under ES&T Phase III). Training was performed during April and May 1997 at the following locations: NASSCO, San Diego, CA; Cascade General, Portland, OR; Electric Boat Corporation, Groton, CT; NORSHIPCO, Norfolk, VA; and Avondale Industries/University of New Orleans, New Orleans, LA. 175 people received training. 35 shipyards were in attendance, along with 8 other organizations related to shipyards (sub-contractors, Navy, etc.). About 200 training manuals were distributed, along with 31 copies of the training material on Zip disk. Comments received from participants indicate that this training was clearly successful. The Subtask was performed by Austin Environmental Inc. (Dana M. Austin). A full report was published as **NSRP Report 0487, April 1997, *Develop Shipyard MACT Implementation Plan And Compliance Tools, Phase II***. A summary report on the training sessions was published on 6 May 1997. Cost of the Subtask was \$20,700.

**Subtask #14 - Survey of Air and Water Quality Pollution Prevention and Control Technology used in Shipyards and Similar Industries.**

This Subtask performed a survey of U. S. shipyards and similar industries to determine what technologies were being implemented or planned to prevent or reduce air emissions and wastewater discharges from facility operations. It also provides a guide that shipyard environmental managers can use to perform a preliminary evaluation of technologies that may have applicability in their facilities. The document covers pollution prevention and control technologies for surface preparation, surface coating, cleaning operations, welding, and wastewater treatment. The Subtask was performed by the Applied Research Laboratory at The Pennsylvania State University. The project was managed by Janice Schneider with Meryl Mallery acting as principal investigator and author. Work began on 15 July 1996 and was completed on 30 January 1998. Findings were published as **NSRP Report 0502, January 1998, *Survey of Air and Water Quality Pollution Prevention and Control Technology Used in Shipyards and Similar Industries***. Cost of the Subtask was \$9,900.

### **Subtask #15 - Tracking ISO 14000 Series**

This Subtask identified, and assessed the desirability of participating in, the various Technical Advisory Groups (TAG's) tasked with developing the guidance documents that together will comprise the ISO 14000 standard. The project had three stages: identification of the TAG's and their guidance documents; review of the literature relating to ISO 14000, followed by discussions with shipyard personnel to determine their interest in participating in the development of guidance documents and implementation plans; and reporting of results to SPC Panel SP-1 (Environmental Effects). The Subtask began on 15 July 1996, and was completed on 7 March 1997 with a full report to Panel SP-1 along with the issuance of a brief to the attending Panel members. The Subtask was performed by Fort & Schlefer, LLP, Washington, DC. Participating were Jennifer J. Zeien, William C. Buckhold, and Thomas A. Lorenzen. Cost of the Subtask was \$4,260.

### **Subtask #16 - XL Opportunities**

The EPA's "Project XL" (for Excellence and Leadership) was an effort to provide enhanced regulatory and permit flexibility to excellent corporate environmental performers. This Subtask was designed to investigate participation in Project XL activities, and identify generic opportunities for achieving environmental protection at shipyards in a 'cleaner and cheaper' manner. The limited goals of the Subtask were to: review the XL program and XL project experiences; assess the technical feasibility of a shipyard XL project; and provide a rough quantification of potential benefits from participation in an XL project. The Subtask began on 15 July 1996 and was completed in February 1997. The Subtask was performed by McKenna & Cuneo, LLP of San Diego, CA (Rodney F. Lorang) and by Austin Environmental Inc. of San Diego, CA. (Dana M. Austin). Results were published as **NSRP Report 0481, February 1997, Shipyard "Project XL" Feasibility Study**. Cost of the Subtask was \$15,000.

### **Subtask #17 - Manual for Environmental and OSHA Inspections of Shipyards.**

This Subtask combined existing experience and knowledge to provide advice concerning the various factors that shipyards should consider with respect to environmental (clean air, clean water, hazardous waste) or occupational safety and health issues involved in environmental and OSHA inspections. The resulting outline discusses the steps that shipyard legal and environmental department personnel, managers and employees should take generally (even when no particular inspection is expected), as well as steps that should be taken when a particular inspection is anticipated, is occurring, or has recently occurred. The outline is devoted primarily to issues raised by federal environmental and occupational safety and health statutes. The outline references various checklists and other materials that should be reviewed in the context of specific types of inspections (e.g. those related to compliance with OSHA, the clean Air Act, the Clean Water Act, etc.). A shipyard safety and environmental agency inspection checklist is included to serve as a ready reference for the shipyard contact during an inspection by a safety or environmental agency. The Subtask was begun on 15 July 1996 and was completed on 29 January 1997. The Subtask was performed by Collier, Shannon, Rill & Scott, PLLC of Washington, DC (John L. Wittenborn, Michael O. Hill) and by Austin Environmental Inc. of San Diego, CA (Dana M. Austin). Results were published as **NSRP Report 0483, January 1997,**

***Environmental and Occupational Safety and Health Inspections: A Guide for Shipyard Managers and Employees.*** Cost of the Subtask was \$9,000.

**Subtask #18 - Sector Notebook Profile on the Shipbuilding and Ship Repair Industry.**

This Subtask was to prepare a Notebook for the shipyard industry, containing a description of the industrial processes used, pollution outputs, pollution prevention opportunities, applicable Federal statutes and regulations, past compliance history, and compliance assistance information. The EPA would carry out printing and distribution. The Notebook would be patterned after those produced by other industries. The Subtask began on 10 Sep 1996 under the management of Atlantic Marine Inc. of Jacksonville, FL (Timothy J. Welsh). The EPA was so impressed by the shipyard industry's willingness to pay for development of the Notebook that it decided (on 11 October 1996) to provide the money and produce the Notebook in-house, requesting (and receiving) shipyard assistance during this effort. This Subtask was therefore canceled. The estimated cost for the Subtask had been \$25,000., but no ES&T funds were spent for preparation of the Notebook.

**Subtask #19 - Shipyard's Guide to Emergency Plan Consolidation: The Integrated Contingency Plan.**

This Subtask provides guidance on developing and implementing the new "One Plan" concept for facility emergency response plans under various federal statutes. It provides a template for shipyards to use in developing facility-specific integrated contingency plans for responding to emergencies. The Subtask began on 18 Dec 1996 and was completed in September 1997. The Subtask was performed by Collier, Shannon, Rill & Scott, PLLC, of Washington, DC (John L. Wittenborn). Results were published as **NSRP Report 0498, September 1997, Template for Developing an Integrated Contingency Plan.** Cost of the Subtask was \$15,450.

**Subtask #20 - Document the Need for Revisions to the recently promulgated Marine Coatings NESHAP.**

This Subtask was to address the concerns arising from the NESHAP. This NESHAP is based on the circa 1992 California MACT standards for VOC's in marine coatings. California shipyards were able to rely on state law variance processes to make those standards workable, and also were able to rely on manufacturer's representations on the VOC content of paints. The NESHAP makes no provision for variances, and holds shipyards accountable for the VOC content of all coatings applied based on spot testing using EPA Method 24. The Subtask began on 18 December 1996. A determination letter was provided on 19 September 1997, which concluded that the best action for the shipyards to take was no action. Rather, the activities of the EPA in this area would be monitored so that activities toward fixing problems in the marine coatings NESHAP could be resumed at an appropriate time. Accordingly the Subtask was closed, with activities to be resumed under a future Subtask when appropriate. The Subtask was performed by McKenna & Cuneo, LLP, of San Diego, CA (Rodney F. Lorang), and by Austin Environmental, Inc. of San Diego, CA (Dana M. Austin). Cost of the Subtask was originally estimated at \$12,000. Funds actually expended totaled \$8,400.

**Subtask #21 - EPCRA Section 313 Delisting Petition for Metals Alloyed in Steels.**

This Subtask assessed the need for a petition to delist, for EPCRA 313 reporting purposes, those metals alloyed in steels and therefore not available to the environment. Without such relief, metals alloyed in steels (nickel, copper, chromium) must be tracked and reported, an action that is expensive, time-consuming, and environmentally unnecessary. Following an investigation, it was decided to piggy-back our position on a related petition submitted by the American Automobile Manufacturers Association (AAMA), and await EPA action on that petition. Following a long period of no EPA activity in this area, the Subtask was closed: future action as needed would be considered under a new Subtask. This Subtask began on 25 November 1996 and was closed due to inactivity on 6 May 1999. It was performed by Bath Iron Works, Bath, ME (Jennifer C. Parker), by McKenna & Cuneo, LLP, San Diego, CA (Rodney F. Lorang), and by Austin Environmental, Inc. of San Diego, CA (Dana M. Austin). Cost of the Subtask was originally estimated at \$15,000. Funds actually expended totaled \$6,750.

**Subtask #22 - Document Technologies Available to Clean Brackish Waters to 50 parts per trillion TBT Levels.**

This Subtask responded to the action taken by the State of Virginia to incorporate limitations of 50 parts per trillion TBT (tributyltin) in shipyard VPDES permits. It sought to document available technologies which shipyards may need to further investigate in order to comply with this requirement. The Subtask concluded that there were NO technologies extant to achieve a reduction in shipyard effluent TBT to below 50 ppt. This has become an important benchmark for the regulatory community to take into consideration before such a limit is actually imposed. The Subtask began on 9 December 1996 and was completed on 27 January 1998. It was performed by Norfolk Shipbuilding & Drydock Corporation, Norfolk, VA (Thomas L. Beacham), and by the Center for Advanced Ship Repair and Maintenance of the Old Dominion University Research Foundation, Norfolk, VA (Dr. Alan W. Messing, Lisa M. Ramirez, Dr. Thomas Fox). Results were published as **NSRP Report 0508, December 1997, *Document Technologies Available to Clean Brackish Waters to 50 PPT TBT Levels***. Cost of the Subtask was \$17,500.

**Subtask #23 - Tracking Development of the Federal Centralized Waste Treatment Rule.**

This Subtask followed the development of the federal categorical effluent guidelines proposed for Centralized Waste Treatment facilities in order to: (1) determine if the proposed standards would remain applicable to shipyards; and (2) participate in the rulemaking process to avoid a situation where shipyards must follow multiple duplicative effluent discharge rules. The Subtask began on 9 December 1996. It was completed on 1 October 1997 with a final presentation of findings to SPC Panel SP-1 on Environmental Effects. Findings were incorporated into full NSRP project N1-96-3. The Subtask was performed by NASSCO, San Diego, CA (John R. Martin), and by CH2M-Hill, San Diego, CA (Brian Hausknecht, Dave Lindberg, Lisa Sullivan). Cost of the Subtask was \$15,000.



#### **Subtask #24 - Preliminary Impact Analysis of Proposed Revision of NAAQS for Ozone and Particulate Matter.**

This Subtask performed a preliminary impact analysis of the proposed revisions to the National Ambient Air Quality Standard for ozone and particulate matter on shipyards, prior to the close of the public comment period on this proposed rule. This provided information that would enable shipyards to determine whether to submit comments on these EPA proposals. Findings were presented to SPC Panel SP-1 participants at a regular meeting in February 1997. Findings were also published as **NSRP Report 0485, February 1997, *Preliminary Impact Analysis of Proposed Revisions of National Ambient Air Quality Standard for Ozone and Particulate Matter***. The Subtask began on 3 January 1997 and was completed in February 1997. The Subtask was performed by Atlantic Marine, Inc., Jacksonville, FL (Wayne S. Holt), by Austin Environmental, Inc., San Diego, CA (Dana M. Austin), and by McKenna & Cuneo, LLP, San Diego, CA. Cost of the Subtask was \$22,925.

#### **Subtask #25 - Comments on Proposed Revision to NAAQS for Ozone and Particulate Matter.**

This Subtask prepared and submitted comments on behalf of the NSRP that would: (1) challenge the EPA's allegations that the current ozone and PM standards do not adequately protect the public from adverse health effects; and (2) argue that the enormous additional compliance costs that would result from the proposed changes to the ozone and PM standards would far exceed any commensurate level in environmental benefits. The Subtask was coordinated with Subtask 24 above. Final comments were submitted to the EPA on 10 April 1997. The Subtask began on 5 February 1997 and was completed on 10 April 1997. It was performed by Collier, Shannon, Rill & Scott, PLLC, Washington, DC (John L. Wittenborn, Chet M. Thompson). Cost of the Subtask was \$15,000.

#### **Subtask #26 - CWA and OPA Regulatory Analysis of Oil and Petroleum-related Activities in Shipyards.**

This Subtask analyzed regulatory requirements and provides guidance for oil and petroleum-related activities that are regulated under the Clean Water Act and the Oil Pollution Act. Shipyards conduct numerous activities involving oil and petroleum products and wastes that are subject to regulation. The patchwork of DOT, EPA, and USCG regulations is confusing both in jurisdiction and requirements. Sometimes one regulation applies, sometimes more than one regulation or agency applies, and sometimes the material or activity is exempt from regulation. This Subtask sorted out these areas, and provides guidance on how activities are regulated. Results were published as **NSRP Report 0497, November 1997, *Shipyard Oil and Petroleum-Related Activities Manual***. The Subtask was performed by NASSCO, San Diego, CA (T. Michael Chee), and by ERM-West, Inc., Walnut Creek, CA (Randy Roig). It began on 6 March 1997 and was completed on 24 October 1997. Cost of the Subtask was \$19,800.

#### **Subtask #27 - Heavy Metal Adsorbents for Storm Water Pollution Prevention.**

This Subtask was to evaluate the potential use of adsorbents for the removal of heavy metals from storm water, and determine the feasibility of placing a porous adsorbent within a

storm water system as a best management practice. It concluded that commercially available storm water collection system components can be adapted to contain a porous adsorber for the removal of heavy metals from storm water, and that the selection of an adequate adsorbent material will require additional research. The Subtask was performed by The Pennsylvania State University, Department of Civil and Environmental Engineering, University Park, PA (Dr. William D. Burgos). It began on 21 March 1997 and was completed in December 1997. Findings were published as **NSRP Report 0514, December 1997, *Heavy Metal Adsorbents for Storm Water Pollution Prevention***. Cost of the Subtask was \$15,000.

#### **Subtask #28 - Development of Shipyard MACT Tracking Software.**

This Subtask developed a software database application to perform required calculations, maintain required records, and prepare monthly and semiannual compliance reports. The software was developed by Atlantic Marine, Inc., Jacksonville, FL (Wayne S. Holt), and by Classic Miniatures, West Palm Beach, FL (Dale O'Bar). The software (Neshap Tracking Software Ver 3.0) was distributed in January 1998. The software was also posted on NSNet. The Subtask began on 25 June 1997, and was completed on 12 February 1998. Cost of the Subtask was \$13,105.

#### **Subtask #40 - Hematite Particulate Determination.**

This Subtask was designed to determine the mass fraction size distribution of particulate matter from the use of hematite during open-air abrasive blasting in a shipyard. It supplemented NSRP full project N1-97-4, Particulate Emission Factors for Blasting Operations and Other Potential Sources. Hematite is gaining acceptance in the shipyards as a dry abrasive blasting media due to its relatively low dust generation rate. These data were needed to model dust emissions in various size categories toward permissible use by shipyards. The Subtask began on 18 August 1999 and was completed on 31 August 1999. It was performed by Atlantic Marine, Inc., Jacksonville, FL (Wayne S. Holt), by Austin Environmental, Inc., Jacksonville, FL (Dana M. Austin), and by LFR Levine Fricke at the Halter Shipyard in New Orleans, LA, concurrently with the work performed for NSRP Project N1-97-4. Findings appear in **NSRP Report 0552, *Particulate Emission Factors for Blasting Operations and Other Potential Sources***. Cost of the Subtask was \$11,838.

#### **Subtask #41 - Comments on EPA's Pretreatment Regulations Proposed Rulemaking.**

This Subtask prepared and submitted comments on behalf of the shipyard industry on important issues pertaining to streamlining the general pretreatment program regulations for existing and new sources of pollution. NSRP member shipyards are indirect (and direct) discharging facilities with extensive experience with EPA's National Pretreatment Program (NPP). These comments provide EPA with additional information and rationale to minimize historic, cumbersome command-and-control policies, improve and update the NPP, protect our Nation's waters, and provide necessary flexibility to publicly-owned treatment works to implement the NPP and achieve the goals of the Clean Water Act. The Subtask began on 16 November 1999, and was completed on 19 November 1999 with the submission of comments to

the EPA. It was performed by Collier, Shannon, Rill & Scott, PLLC, Washington, DC (John L. Wittenborn, Jeffrey S. Longworth). Cost of the Subtask was \$2,000.

**Subtask #42 - Prepare and Deliver an Environmental Update for Environmental Managers on Feb 16-18, 2000.**

This Subtask was to prepare and deliver an environmental update for Environmental Managers on 16-18 February 2000. The presentation was about two hours in length, and was supported by copies of overhead slides and other written material distributed to the attendees. It covered many subjects, including hazardous and solid waste, the Clean Air Act, the Clean Water Act, Toxic Chemical Issues, and Enforcement Matters. It was delivered at the regular meeting of SPC Panel SP-1 on 16 February 2000 in Orlando, FL, where it was well received. The Subtask was performed by Collier, Shannon, Rill & Scott, PLLC, Washington, DC (John L. Wittenborn). The Subtask began on 13 January 2000 and was completed on 16 February 2000. Cost of the Subtask was \$5,000.

**SPC Panel SP-1 AD HOC COMMITTEE for Environmental Studies and Testing**

Members of the SPC Panel SP-1 Ad Hoc Committee for Environmental Studies and Testing during most of this time period were:

Steven Lacoste, Chairman	Avondale Industries, Inc.
Tom Atwood	USCG Ketchikan, AK
Thomas L. Beacham	NorShipCo
Julian M. Bingham	Atlantic Marine, Inc. - Mobile
T. Michael Chee	NASSCO
David Donaldson	Cascade General, Inc.
Donna L. Frechette	Electric Boat Corp.
Wayne S. Holt	Atlantic Marine, Inc. - Jacksonville
Pat Killeen	Halter Marine Group
Frank H. Thorn	Newport News Shipbuilding
Rodney A. Robinson	R-P-M (Project Manager)

**OVERALL SUMMARY OF ENVIRONMENTAL STUDIES AND TESTING TO DATE**

Project **N1-89-2** for **Phase I** of Environmental Studies and Testing accomplished **4** Subtasks. Project **N1-90-5** for **Phase II** of Environmental Studies and Testing fell below the funding cutoff and was not performed. Project **N1-92-2** covered **Phase III** of Environmental Studies and Testing, and accomplished **8** Subtasks. This Project **N1-96-4** covered **Phase IV** of Environmental Studies and Testing, accomplished **18** Subtasks. Project **N1-97-1** covering **Phase V** of Environmental Studies and Testing, involving **13** Subtasks, is nearly completed. Project **N1-98-1** covering **Phase VI** of Environmental Studies and Testing, involving **9** Subtasks, is currently underway with completion mandated for December 2000.

Report prepared by Rodney A. Robinson, Project Manager  
President, Robinson-Page-McDonough and Associates, Inc. Post Office Box 9, Greenland, New Hampshire 03840-0009  
Phone and Fax (603) 436-7762. <Rar rpm@aol.com>

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